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U.S. ARMY MEDICAL SCHOOL
ARMY MEDICAL CENTER
WASHINGTON, D. C.



ENLISTED SPECIALISTS COURSE

FOR

X-RAY TECHNICIANS

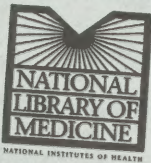
ENLISTED PERSONNEL, MEDICAL DEPARTMENT,

U. S. ARMY

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Medical Corps,
Assistant Commandant.

Lieut. Colonel George C. Dunham,
Medical Corps,
Secretary.

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INSTRUCTORS FOR TECHNICIANS IN ROENTGENOGRAPHY.

Lieut. Colonel Henry W. Grady, M. C. Chief, Radiologic Section, W.R.G.H.
Captain Alfred A. de Lorimier, M. C. Instructor, Army Medical School.

Staff Sergeant Lawrence F. Black, Med. Dept.	Ass't Instructor in Physics.
Sergeant Kenneth E. Ranson, Med. Dept.	Ass't Instructor in Typing & Filin
Sergeant Elmer L. Babb, Med. Dept.	Ass't Instructor in Technique
Sergeant Roy C. Day, Med. Dept.	Ass't Instructor in Shop Work.
Pvt. 1st class Wesley Moore, Med. Dept.	Ass't Instructor in Darkroom Pro- cedure.

THE ARMY MEDICAL SCHOOL
ARMY MEDICAL CENTER
WASHINGTON, D. C.

BASIC COURSE
FOR
TECHNICIANS IN ROENTGENOGRAPHY.

MISSION

To prepare enlisted personnel of the Medical Department to the capacity of performing intelligently the technical duties in the field of Roentgenology; to so train them along these lines that they will be familiar, not only with the actual operation of x-ray machines, but also as to the proper way of handling patients, of recording and caring for the records, and of assisting the Roentgenologist in his diverse problems.

DURATION

This course covers a period of twelve months. Instruction will be carried on daily from 8:30 A.M. to 11:30 A.M. and from 1:00 P.M. to 4:00 P.M. except Wednesday and Saturday afternoons and Sundays and Holidays. Saturday mornings will be devoted to written and practical examinations.

PREREQUISITES

A basic education is prerequisite to insure an understanding especially of elementary physics and chemistry. There must also be had ability to reason mathematically and perform simple calculations. Credentials of a Grammar School education or its equivalent will be considered satisfactory.

METHODS OF INSTRUCTION

The applicatory method of instruction will be employed throughout. Lectures and demonstrations will be given for orientation. Full opportunity will be allowed the class, at the close of each period, to ask questions and to clear up all doubtful points. Conferences on the information thus given will be so arranged that there will be a background for the practical work given, both at the Army Medical School and in the X-ray Clinic at Walter Reed General Hospital. The written and practical examinations will deal not only with the material covered during the week, but also with that which was given at any time previously. Eliminations will be made of those who show themselves deficient at the end of a period of from two to three months.

ALLOTMENT OF TIME

There will be a total of 1,522 hours. This time will be allotted to the general subjects as follows:

X-ray Physics; theoretical and practical	144 hour
Wiring diagrams	21 hour
Trouble searching	90 hour
Safety precautions	18 hour
Maintenance and repair of x-ray equipment	364 hour
Accessory equipment	24 hour

Films, film factors, film processing, darkroom procedure	57 hours
Filing	5 hours
Anatomy, surface and roentgen	30 hours
Positioning and manipulation of x-ray units	122 hours
Localization of foreign bodies	6 hours
Stereoscopic projections	2 hours
Gallbladder technique	3 hours
Gastro-intestinal series	3 hours
Barium enemas	2 hours
Pyelo-ureterograms	4 hours
Chest fluoroscopy	3 hours
Ray opaque injections	5 hours
Pelvimetry	5 hours
Property: Medical Department, stressing Class #6	14 hours
Special problems	20 hours
Clinical application (Walter Reed General Hospital)	306 hours
Typing and clerical instruction	170 hours
Examinations	104 hours

OBJECTIVE OF COURSE

1. X-ray Physics: A fundamental consideration of those principles which are basic to an understanding of the production of X-rays. There will be portrayed not only the theoretical explanations but each student will be given the opportunity to actually handle, construct, and dismantle equipment. There will be included, in this manner, the following lectures, demonstrations and individual applications:

- (1) Source and nature of X-rays.
- (2) The electron theory.
- (3) Electricity: terrestrial versus magnetism, chemical and dynamic.
- (4) Electrical units: ampere; milliamperes; volt, kilovolt; ohm; megohm, watt and kilowatt, K.V.A. and horse-power.
- (5) Circuits: series versus parallel.
- (6) Ohm's Law and Power Law.
- (7) Component parts of electrical apparatus, as applied to x-ray units:

Transformers: step-up versus step-down.

Volt selector (auto-transformer).

Generator versus motor.

Rheostats, choke coils, fuses and circuit breakers.

- (8) Measuring devices: ammeters, milliammeters, voltmeters, sphere gaps and wattmeters, etc.
- (9) X-ray tubes: principles of; functioning; types and capacities.
- (10) Focalographs: focal spots; x-ray tube characteristics.
- (11) Types of rectification: mechanical and thermionic.
- (12) Condensers and constant potential units.
- (13) Measurement of quantity output; dosimeters.
- (14) Measurement of quality output: the half value layer.

2. Wiring Diagrams: A dissection study of the U. S. Army Bedside Unit and more complicated designs. There will be included the following lectures:

- (1) The U. S. Army Bedside Unit:

Wiring diagram.

Operation of (self rectification).
Rotary converter.

(2) Stationary units:

Wiring diagram.
Rectification (mechanical and thermionic).
Operation of instruction unit.

(3) Shock proofing:

Wiring diagrams.

(4) Ray proofing.

3. Trouble Searching: An orientation for cool and collected deliberation as to where disorders are most likely to occur; the indications presented from the various locations and the means of testing the many possibilities.

Demonstrations will be given of disassembled units and test problems will include:

- (a) Burned out fuses.
- (b) Open circuits.
- (c) Dead buttons.
- (d) Poor contacts.
- (e) Shorts.
- (f) Lack of filament circuit.
- (g) Transformer defects
- (h) Defects in rectification.
- (i) **Tube defects.**

4. Safety Precautions: An emphasis as to various routine measures which must be constantly practised in order to avoid not only interruptions in the functioning of equipment but also to avoid electrical and radiation hazards.

- (1) Interval checking of equipment.
- (2) Safety measures as regards the patient.
- (3) Testing as to stray radiation.
- (4) Routine blood counts.
- (5) Emergency treatment of electrical shock.

5. Maintenance and Repair of X-ray Equipment: Practical application in shooting trouble; disassembling and assembling units and actually handling the necessary tools for repair. The maintenance shop, conducted by the X-ray Department of the Army Medical School, furnishes diversified opportunities for observation and practical applications in the repair of X-ray and Physiotherapeutic appliances. This work is available throughout the course.

6. Accessory Equipment: An explanation as to quality improvements obtained by involving extraneous devices. These discussions will follow the main descriptions of fundamentals in order that too much emphasis will not seem to be stressed as to their being required in all cases. As far as possible teaching will be given as to student-constructed equipment in

substitution for expensive non-standard factory items. These discussions will include:

- (1) Cones.
- (2) Diaphragms.
- (3) Grids.
- (4) Cassette changers.
- (5) Localizers.
- (6) Kymographs.

7. Films: Film Factors: Film Processing: A study as to the nature of x-ray films and the diverse factors concerned with quality production in the roentgenograms. Emphasis will be laid upon darkroom procedure and the errors there, which are causative of film trouble ; darkroom construction (light proofing and ventilation); scientific illumination; arrangement and care of equipment; loading and unloading of films, and processing (with emphasis on "time-temperature" development and proper care of the solutions). The constituents of the developer and of the fixing solutions will be explained and these solutions will be made up. by student groups, in turn. The relation of errors in technique will be discussed and demonstrated.

8. Filing: A brief description as to the methods of maintaining records. This will include explanation of Medical Department Form #55.1; the importance of identification by numbering; the taking of dictation and proper filing.

9. Roentgen and Surface Anatomy: To familiarize the prospective technician with those terms which are commonly used in this field. There will be included the terms concerning surface anatomy, which would be used by the clinician, in the making of a request, and also the more important skeletal landmarks which are concerned both for the positioning, in roentgenography, and for the taking of dictation (the descriptive interpretation to be made by the roentgenologist). The B.N.A. nomenclature will, for the most part, be adopted, but in those cases where other nomenclature is more commonly used both terms will be given.

10. Positioning and Manipulation of X-ray Units: A scientific exposé of the proper positioning of parts. There will be considered landmarks, sites for centering, precautions and indications for additional equipment. Conservation of film surface and proper identification of films (during exposure) will be stressed. Each student will be required to make a complete survey of the entire skeleton using the Army Bedside Unit and also using stationary units (old types and modern). Measurement calipers will be constructed by each student. With the use of these, kilovoltage values for the individual patient will be calculated according to the muscularity or adiposity of the case. In this way exposure charts will be constructed. This course will be terminated with practical instruction on the "modern shock proof" unit (in its usage for bedside or dental work and its application for field purposes).

11. Localization of Foreign Bodies: The students will not be confused by explanation of the many intricate methods described. Concentration will be made upon the simplest triangulation and cone methods. Thus, both fluoroscopic and roentgenographic procedures will be demonstrated; the latter will be practised by each student.

12. Stereoscopic Projections: A brief description will be given of the theory concerned with the exposures necessary for depth perception. Each student will carry out the procedure of shifting the x-ray tube and changing the films while maintaining immobilization of the patient. Moreover, instruction will include the proper placing of the processed films in the stereoscope.

13. Gallbladder Technique: Information which should be given the patient will be outlined as to the proper preparation for concentration of the dye. Technique for spot films versus subsequent localizations, using cones or diaphragms will be practised by each student.

14. Gastro-intestinal Series: An outline will be given as to the several routines in vogue, for this work. Practical application will be carried out in the clinic at Walter Reed General Hospital.

15. Barium Enemas: Emphasis will be given as to assisting the roentgenologist for the barium filing, subsequent evacuation studies and air injections. Application of such assistance will be carried out at Walter Reed General Hospital.

16. Chest Fluoroscopy: Emphasis will be stressed as to the handling of patients in a darkened room; precautions which must be taken; the overcoming of the patient's apprehension or fear and anticipation of the roentgenologist's needs.

17. Ray Opaque Injections: A brief description of the problems of the roentgenologist will be given, regarding sinus injections and infiltrations for outlining the bronchial tree.

18. Property: An orientation as to the proper forms for requisitions (forms 16 a - b - c and d); standard (class 6) versus non-standard supplies; recording the non-expendable items.

19. Special Problems: Each student will undertake a minor investigation; either a problem which has arisen in his own mind or one which might be assigned to him. Such problems may be entirely in the realm of physics or of roentgenography but they must have some bearing on the general field. A short summary will be written.

20. Clinical Application: The class will be divided into three sections. Each section will be assigned for assisting in the x-ray department of Walter Reed General Hospital for two periods of two months (each semester). In this way, assignments will continue throughout the year. It is planned to allow equal advantages to each of the sections. To insure this, the section which will be thusly assigned, during the first two months of the course (when the reasons for activities there would not yet be realized), that section will have a second opportunity during the last two months of the course. In like manner the second section will be given the third and fourth months, and, therefore, the ninth and tenth months, etc. However, the entire class will be brought together for two hours each day for lectures at the Army Medical School and the entire class will be examined together each Saturday morning.

21. Typing: To equip the prospective technician so that he can perform not only the technical duties concerned with the actual making of roentgenographs, but, in addition, that he might fill that greatly needed capacity

of recording the interpretations as given by the roentgenologist. The practise vocabulary will consist of anatomical terms.

22. Examinations: Written examinations will be held each Saturday morning. Each student will be rated not only upon the results of these examinations, but will be given a "general efficiency rating" based upon application, intelligence, judgment and common sense, initiative, tact, observation, neatness, aptitude and conduct. A complete notebook is required which will be examined and graded periodically during the course. Individual film-work produced by students during period of "exposing and processing" will be kept for final examination and graded at the expiration of the course. To maintain a higher caliber of qualifications, those demonstrating incapacibilities during the first four months will be returned to their stations; certificates will be given only to those having a general average of 75% or more, for the year's course.

WEEKLY SCHEDULE

1st Week

	8:30 A.M. to 10:30 A.M.	10:30 A.M. to 11:30 A.M. Lectures	1:00 P.M. to 3:00 P. M.	3:00 P.M. to 4:00 P.M. Demonstrations
Monday	Section 1. Walter Reed General Hospital Section 2. Typing Section 3. Maintenance and Repair Shop	Source of x-rays	W. R. G. H. Shop and Machine Work	Characteristics of x-rays
Tuesday		Nature of x-rays		Electromagnetic Spectrum
Wednesday		Electron Theory	No Classes	
Thursday		Electricity	1. Sec. 2. Sec. 3. Sec.	Electron flow
Friday		Forms of Electricity	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

2nd Week

Monday	Section 1. Walter Reed General Hospital Section 2. Typing Section 3. Maintenance and Repair Shop	Direct Currents	W. R. G. H. Shop and Machine Work	Galvanomic Currents
Tuesday		Alternating Currents		Faradic Currents
Wednesday		Amperes; Milliamperes	No Classes	
Thursday		Volts; Kilovolts	1. Sec. 2. Sec. 3. Sec.	Registration, Units
Friday		Ohms; Megohms	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

WEEKLY SCHEDULE

3rd Week

	8:30 A.M. to 10:30 A.M.	10:30 A.M. to 11:30 A.M. Lectures	1:00 P.M. to 3:00 P.M.	3:00 P.M. to 4:00 P.M. Demonstrations
Monday	Section 1. Walter Reed General Hospital Section 2. Typing Section 3. Maintenance and Repair Shop	Watt; Kilowatt	W. R. G. H. Shop and Machine Work	Registration, units, resistance
Tuesday		Kilowatt versus K. V. A.		Effects, units of power
Wednesday		Horse-power	No Classes	
Thursday		Ohm's Law	1. Sec. 2. Sec. 3.	Mathematical relation of voltage to current
Friday		Ohm's Law	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

4th Week

Monday	Section 1. Walter Reed General Hospital Section 2. Typing Section 3. Maintenance and Repair Shop	Power Law	W. R. G. H. Shop and Machine Work	Mathematical relation of voltage and watts
Tuesday		Power Law		Mathematical relation of voltage and watts
Wednesday		Circuits, Series	No Classes	
Thursday		Circuits, Parallel	1. Sec. 2. Sec. 3.	Wiring, Series versus Parallel
Friday		Resistance, Series	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

WEEKLY SCHEDULE
5th Week

	8:30 A.M. to 10:30 A.M.	10:30 A.M. to 11:30 A.M. Lectures	1:00 P.M. to 3:00 P.M.	3:00 P.M. to 4:00 P.M. Demonstrations
Monday	Section 1. Walter Reed General Hospital Section 2. Typing Section 3. Maintenance and Repair Shop	Resistance in Parallel	W. R. G. H. Shop and Machine Work	Registry, Resistance Parallel versus Series
Tuesday		Induction Coils		Induction of Currents
Wednesday		Transformers, Step-down	No Classes	
Thursday		Transformers Step-up	Sec. 1. Sec. 2. Sec. 3.	Performance, Step-down and Step-up Transformers
Friday		Auto- transformers	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

6th Week

Monday	Section 1. Walter Reed General Hospital Section 2. Typing Section 3. Maintenance and Repair Shop	Choke Coils	W. R. G. H. Shop and Machine Work	Impedance
Tuesday		Rheostats		Resistance
Wednesday		Resistors	No Classes	
Thursday		Fuses	Sec. 1. Sec. 2. Sec. 3.	Counteracting Surges
Friday		Circuit breakers	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

WEEKLY SCHEDULE

7th Week

	8:30 A. M. to 10:30 A. M.	10:30 A.M. to 11:30 A.M. Lectures	1:00 P.M. to 3:00 P. M.	3:00 P.M. to 4:00 P.M. Demonstrations
Monday	Section 1. Walter Reed General Hospital Section 2. Typing Section 3. Maintenance and Repair Shop	Generators, Direct Current	W. R. G. H. Shop and Machine Work	Minature Generators Direct Current
Tuesday		Generators, Alternating Current		Minature Generators Alternating Current
Wednesday		2 phase and 3 phase units	No Classes	
Thursday		Motors, Direct. Current	Sec. 1. Sec. 2. Sec. 3.	Operation of Motors
Friday		Motors Alternating Current	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

8th Week

Monday	Section 1. Walter Reed General Hospital Section 2. Typing Section 3. Maintenance and Repair Shop	Ammeters	W. R. G. H. Shop and Machine Work	Construction of ammeters
Tuesday		Milliammeters		Construction of Milliammeters
Wednesday		Voltmeters	No Classes	
Thursday		Sphere-gap Calibration	Sec. 1. Sec. 2. Sec. 3.	Calibration, Voltage and Kilovoltage
Friday		Watt meter	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

WEEKLY SCHEDULE.

9th Week

	8:30 A.M. to 10:30 A.M.	10:30 A.M. to 11:30 A.M. Lectures	1:00 P.M. to 3:00 P.M.	3:00 P.M. to 4:00 P.M. Demonstrations
Monday	Section 2. Walter Reed General Hospital Section 3. Typing Section 1. Maintenance and Repair Shop	Early Gas tubes	W. R. G. H. Shop and Machine Work	Electron stream; impact, focal spot
Tuesday		Modification of gas tubes		Gas tube Performances
Wednesday		Hot cathode tubes	No Classes	
Thursday		Rectification Discs	Sec. 2. Sec. 3. Sec. 1.	Performance, Hot cathode tubes
Friday		Rectification Cross arm	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

10th Week

Monday	Section 2. Walter Reed General Hospital Section 3. Typing Section 1. Maintenance and Repair Shop	Self- rectification	W. R. G. H. Shop and Machine Work	Mechanical rectification
Tuesday		Half-wave thermionic rectification		Thermionic rectification
Wednesday		Full-wave Thermionic rectification	No Classes	
Thursday		Remote control switches electro- magnetic	Sec. 2. Sec. 3. Sec. 1.	Operation of remote control
Friday		Remote control switches mercury dip	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

WEEKLY SCHEDULE

11th Week

	8:30 A.M. to 10:30 A.M.	10:30 A.M. to 11:30 A.M. Lectures	1:00 P.M. to 3:00 P.M.	3:00 P.M. to 4:00 P.M. Demonstrations
Monday	Section 2. Walter Reed General Hospital Section 3. Typing Section 1. Maintenance and Repair Shop	Symbols	W. R. G. H. Shop and Machine Work	Sketching, wiring
Tuesday		Wiring diagram, U.S. Army Bed- side Unit		Wiring diagrams
Wednesday		Ibid	No Classes	
Thursday		Rotary Converters	Sec 2. Sec 3. Sec 1.	Operation, Rotary Converter
Friday		Halving of kilovoltage	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

12th Week

Monday	Section 2. Walter Reed General Hospital Section 3. Typing Section 1. Maintenance and Repair Shop	Simple stationary units	W. R. G. H. Shop and Machine Work	Disassembled unit
Tuesday		Ibid		Performance of various models
Wednesday		Ibid	No Classes	
Thursday		Ibid	Sec 2. Sec 3. Sec 1.	U.S. Army field unit
Friday		Ibid	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

WEEKLY SCHEDULE

13th Week

	8:30 A.M. to 10:30 A.M.	10:30 A.M. to 11:30 A.M. Lectures	1:00 P.M. to 3:00 P.M.	3:00 P.M. to 4:00 P.M. Demonstrations
Monday	Section 2. Walter Reed General Hospital Section 3. Typing Section 1. Maintenance and Repair Shop	Precautionary measures	W. R. G. H. Shop and Machine work	Circuit defects
Tuesday		Checking of fuses and switches		Ibid
Wednesday		Checking of open circuits	No Classes	
Thursday		Filament defects	Sac. 2. Sac. 3. Sac. 1.	Circuit defects
Friday		Transformer defects	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

14th Week

Monday	Section 2. Walter Reed General Hospital Section 3. Typing Section 1. Maintenance and Repair Shop	Routine checking of equipment	W. R. G. H. Shop and Machine work	Hazard Checking
Tuesday		Safety of the Patient		Grounding
Wednesday		Testing for stray radiation	No Classes	
Thursday		Emergency treatment of electrical shock	Sac. 2. Sac. 3. Sac. 1.	Application of Schaeffer regime
Friday		Effects upon the hematopoietic system	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

WEEKLY SCHEDULE

15th Week

	8:30 A.M. to 10:30 A.M.	10:30 A.M. to 11:30 A.M. Lectures	1:00 P.M. to 3:00 P.M.	3:00 P.M. to 4:00 P.M. Demonstrations
Monday	Section 2. Walter Reed General Hospital Section 3. Typing Section 1. Maintenance and Repair Shop	Cones and Cylinders	W. R. G. H. Shop and Machine work	Secondary fog
Tuesday		Diaphragms		Making of diaphragms
Wednesday		Moving curved grids	No Classes	
Thursday		Moving flat grids	Sec. 2. Sec. 3. Sec. 1.	Dissection of grids
Friday		Fixation devices	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

16th Week

Monday	Section 2. Walter Reed General Hospital Section 3. Typing Section 1. Maintenance and Repair Shop	Films, Composition of	W. R. G. H. Shop and Machine work	Inflamability of films
Tuesday		Cardboard holders		Loading of cardboard holders common errors
Wednesday		Intensifying screens	No Classes	
Thursday		Cassettes	Sec. 2. Sec. 3. Sec. 1.	Mounting, Cassettes, loading and errors
Friday		Mounting of intensifying screens	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

WEEKLY SCHEDULE
17th Week

	8:30 A.M. to 10:30 A.M.	10:30 A.M. to 11:30 A.M. Lectures	1:00 P.M. to 3:00 P.M.	3:00 P.M. to 4:00 P.M. Demonstrations
Monday	Section 3. Walter Reed General Hospital Section 1. Typing Section 2. Maintenance and Repair Shop	Detail	W. R. G. H. Shop and Machine Work	Films showing variations in detail
Tuesday		Factors concerned with detail		
Wednesday		Contrast	No Classes	
Thursday		Factors concerned with contrast	Sec. 3. Sec. 1. Sec. 2.	Films showing variations in contrast
Friday		Review	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

18th Week

Monday	Section 3. Walter Reed General Hospital Section 1. Typing Section 2. Maintenance and Repair Shop	Radiographic density	W. R. G. H. Shop and Machine Work	Films showing variations in radiographic density
Tuesday		Factors concerned with radiographic density		
Wednesday		Distortion	No Classes	
Thursday		Factors concerned with distortion	Sec. 3. Sec. 1. Sec. 2.	Films showing variations in distortion.
Friday		Review	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

WEEKLY SCHEDULE

19th Week

	8:30 A.M. to 10:30 A.M.	10:30 A.M. to 11:30 A.M. Lectures	1:00 P.M. to 3:00 P.M.	3:00 P.M. to 4:00 P.M.
Monday	Section 3. Walter Reed General Hospital Section 1. Typing Section 2. Maintenance and Repair Shop	The upper extremity, surface anatomy	Section 3. W. R. G. H.	Section 1. Shop and Machine work
Tuesday		Osteology, the hand	Section 2.	
Wednesday		Roentgenography of the hand	No Classes	
Thursday		Osteology, the wrist	Section 3. W. R. G. H.	Sections 1 & 2. Positioning and manipulation for roentgenography
Friday		Roentgenography of the wrist	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

20th Week

Monday	Section 3. Walter Reed General Hospital Section 1. Typing Section 2. Maintenance and Repair Shop	Osteology of the radius and ulna	Section 3. W. R. G. H.	Section 1. & 2. Positioning and manipulation for roentgenography
Tuesday		Roentgenography of the radius and ulna		
Wednesday		Osteology, the humerus	No Classes	
Thursday		Roentgenography of the elbow	Section 3 W. R. G. H.	Sections 1. & 2. Positioning and manipulation for roentgenography
Friday		Osteology, the shoulder girdle	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

WEEKLY SCHEDULE

21st Week

	8:30 A.M. to 10:30 A.M.	10:30 A.M. to 11:30 A.M. Lectures	1:00 P.M. to 3:00 P.M.	3:00 P.M. to 4:00 P.M.
Monday	Section 3. Walter Reed General Hospital Section 1. Typing Section 2. Maintenance and Repair Shop	Roentgenography of the shoulder	Section 3. W. R. G. H. Section 1. & 2. Positioning and manipulation for roentgenography	
Tuesday		Cardboard holder versus cassette roentgenography		
Wednesday		Osteology, the foot	No Classes	
Thursday		Angle boards versus tilting, tube	Section 3. W. R. G. H. Sections 1. & 2. Positioning and manipulation for roentgenography	
Friday		Roentgenography of the foot	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

22nd Week

Monday	Section 3. Walter Reed General Hospital Section 1. Typing Section 2. Maintenance and Repair Shop	Osteology of the ankle	Section 3. W. R. G. H. Section 1. & 2. Positioning and manipulation for roentgenography	
Tuesday		Roentgenography of the ankle		
Wednesday		Osteology of the tibia and fibula	No Classes	
Thursday		Roentgenography of the tibia and fibula	Section 3. W. R. G. H. Sections 1. & 2. Positioning and manipulation for roentgenography	
Friday		Osteology of the femur	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

WEEKLY SCHEDULE
23rd Week

	8:30 A.M. to 10:30 A.M.	10:30 A.M. to 11:30 A.M. Lectures	1:00 P.M. to 3:00 P.M. 3:00 P. M. to 4:00 P.M.
Monday	Section 3. Walter Reed General Hospital Section 1. Typing Section 2. Maintenance and Repair Shop	Roentgenography of the knee	Section 3. W. R. G. H. Sections 1. & 2. Positioning and manipulation for roentgenography
Tuesday		Roentgenography of the femur	
Wednesday		Soft tissue Roentgenography of the extremities	No Classes
Thursday		Osteology, innominate bones	Section 3. W. R. G. H. Sections 1 & 2. Positioning and manipulation for roentgenography
Friday		Roentgenography of the hip	
Saturday	Weekly Examinations		No Classes

24th Week

Monday	Section 3. Walter Reed General Hospital Section 1. Typing Section 2. Maintenance and Repair Shop	Osteology cervical spine	Section 3. W. R. G. H. Section 1. & 2. Positioning and manipulation for roentgenography
Tuesday		Roentgenography of the cervical spine	
Wednesday		Osteology, thoracic spine	No Classes
Thursday		Roentgenography thoracic spine	Section 3. W. R. G. H. Sections 1 & 2. Positioning and manipulation for roentgenography
Friday		Osteology, Lumbar spine and sacrum	
Saturday	Weekly Examinations		No Classes

WEEKLY SCHEDULE

25th Week

	8:30 A. M. to 10:30 A.M.	10:30 A.M. to 11:30 A.M. Lectures	1:00 P.M. to 3:00 P.M.	3:00 P.M. to 4:00 P.M.
Monday	Section 3. Walter Reed General Hospital Section 1. Typing Section 2. Maintenance and Repair Shop	Stereo Roentgenography	Section 3. W. R. G. H. Sections 1. & 2. Positioning and manipulation for roentgenography	
Tuesday		Cassette changers		
Wednesday		Roentgenography of the pelvis	No Classes	
Thursday		Roentgenography of the coccyx	Section 3. W. R. G. H. Sections 1. & 2. Positioning and manipulation for roentgenography	
Friday		Review	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

26th Week

Monday	Section 3. Walter Reed General Hospital Section 1. Typing Section 2. Maintenance and Repair Shop	Osteology of the calvarium	Section 3. W. R. G. H. Sections 1. & 2. Positioning and manipulation for roentgenography	
Tuesday		Osteology of the base of the skull		
Wednesday		Roentgenography of the skull	No Classes	
Thursday		Osteology of the facial bones	Section 3. W. R. G. H. Sections 1. & 2. Positioning and manipulation for roentgenography	
Friday		Paranasal Sinuses	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No. Classes	

WEEKLY SCHEDULE

27th Week

	8:30 A.M. to 10:30 A.M.	10:30 A.M. to 11:30 A.M. Lectures	1:00 P.M. to 3:00 P.M.	3:00 P.M. to 4:00 P.M.
Monday	Section 3. Walter Reed General Hospital Section 1. Typing Section 2. Maintenance and Repair Shop	Mastoid Sinuses	Section 3. W. R. G. H. Section 1. & 2. Positioning and manipulation for roentgenography	
Tuesday		Roentgenography Paranasal sinuses and mastoids		
Wednesday		Lung roentgenography	No Classes	
Thursday		Heart roentgenography	Section 3. W. R. G. H. Sections 1. & 2. Positioning and manipulation for roentgenography	
Friday		Soft tissue roentgenography of the abdomen	Cleaning and inspection of equipment	
Saturday		Weekly Examinations	No Classes	

28th Week

Monday	Section 3. Walter Reed General Hospital Section 1. Typing Section 2. Maintenance and Repair Shop	Cholecystography studies; preparation	Section 3. W. R. G. H. Sections 1. & 2. Positioning and manipulation for roentgenography	
Tuesday		Cholecystography studies of spot films and diaphragms		
Wednesday		Cholecystography uprights	No Classes	
Thursday		Kidney, Ureter and Urinary Bladder; soft tissue studies	Section 3. W. R. G. H. Sections 1. & 2. Positioning and manipulation for roentgenography	
Friday		Intravenous, retrograde pyelography	Cleaning and inspection of equipment	
Saturday		Weekly Examinations	No Classes	

WEEKLY SCHEDULE

29th Week

	8:30 A.M. to 10:30 A.M.	10:30 A.M. to 11:30 A.M. Lectures	1:00 P.M. to 3:00 P.M.	3:00 P.M. to 4:00 P.M.
Monday	Section 3. Walter Reed General Hospital Section 1. Typing Section 2. Maintenance and Repair Shop	Roentgenography lateral projections; G.U. Tract versus G.B.	Section 3. W. R. G. H. Sections 1. & 2. Positioning and manipulation for roentgenography	
Tuesday		Relative part film distances		
Wednesday		The Vascular system	No Classes	
Thursday		Superficial folds and tumors	Section 3. W. R. G. H. Sections 1. & 2. Positioning and manipulation for roentgenography	
Friday		Review	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

30th Week

Monday	Section 3. Walter Reed General Hospital Section 1. Typing Section 2. Maintenance and Repair Shop	Gastro-intestinal studies; Preparation	Section 3. W. R. G. H. Sections 1. & 2. Positioning and manipulation for roentgenography	
Tuesday		Gastro-intestinal studies; fluoroscopy		
Wednesday		Gastro-intestinal studies; roentgenography	No Classes	
Thursday		Barium Enemas; preparation for	Section 3. W. R. G. H. Sections 1. & 2. Positioning and manipulation for roentgenography	
Friday		Barium Enemas; roentgenography	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

WEEKLY SCHEDULE

31st Week

	8:30 A.M. to 10:30 A.M.	10:30 A.M. to 11:30 A.M. Lectures	1:00 P.M. to 3:00 P.M. 3:00 P.M. to 4:00 P.M.
Monday	Section 3. Walter Reed General Hospital Section 1. Typing Section 2. Maintenance and Repair Shop	Chest fluoroscopy	Section 3. W. R. G. H. Sections 1. & 2. Positioning and manipulation for roentgenography
Tuesday		Foreign body localization; 2-dimensional projection	
Wednesday		Foreign body localization; triangulation method	No Classes
Thursday		Foreign body localization; fixed cone method	Section 3. W. R. G. H. Sections 1. & 2. Positioning and manipulation for roentgenography
Friday		Review	Cleaning and inspection of equipment
Saturday	Weekly Examinations		No Classes

32nd Week

Monday	Section 3. Walter Reed General Hospital Section 1. Typing Section 2. Maintenance and Repair Shop	The bronchial tree; fluoroscopy of	Section 3. W. R. G. H. Sections 1. & 2. Positioning and manipulation for roentgenography
Tuesday		The bronchial tree; roentgenography of	
Wednesday		Pneumo-roentgenography	No Classes
Thursday		Roentgenography after opaque injections, sinus tract etc.	Section 3. W. R. G. H. Sections 1. & 2. Positioning and manipulation for roentgenography
Friday		Review	Cleaning and inspection of equipment
Saturday	Weekly Examinations		No Classes

WEEKLY SCHEDULE

33rd Week

	8:30 A.M. to 10:30 A.M.	10:30 A.M. to 11:30 A.M. Lectures	1:00 P.M. to 3:00 P.M.	3:00 P.M. to 4:00 P.M.
Monday	Section 3. Walter Reed General Hospital Section 1. Typing Section 2. Maintenance and Repair Shop	Developer, activity of each constituent	Section 3. W. R. G. H.	Sections 1. & 2. Positioning
Tuesday		Artifacts due to development errors	and manipulation for	roentgenography
Wednesday		The fixing bath action of each constituent	No Classes	
Thursday		Artifacts due to fixation errors	Section 3. W. R. G. H.	Sections 1. & 2. Positioning and manipulation for roentgenography
Friday		Preparation and control of solutions	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

34th Week

Monday	Section 2. Walter Reed General Hospital Section 3. Typing Section 1. Maintenance and Repair Shop	Features of darkroom construction	Section 2. W. R. G. G.	Sections 3. & 1. Positioning
Tuesday		Light testing	and manipulation for	roentgenography
Wednesday		Testing for stray radiation	No Classes	
Thursday		Errors in darkroom procedure	Section 2. W. R. G. H.	Sections 3. & 1. Positioning and manipulation for roentgenography
Friday		Review	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

WEEKLY SCHEDULE

35th Week

	8:30 A.M. to 10:30 A.M.	10:30 A.M. to 11:30 A.M. Lectures	1:00 P.M. to 3:00 P.M.	3:00 P.M. to 4:00 P.M.
Monday	Section 2. Walter Reed General Hospital. Section 3. Typing Section 1. Maintenance and Repair Shop	Medical Department form 55 1	Section 2. W. R. G. H. Sections 3. & 1. Positioning	
Tuesday		Filing of records	and manipulation for roentgenography	
Wednesday		Preparation for reporting of films	No Classes	
Thursday		Cross filing	Section 2. W. R. G. H. Section 3. & 1. Positioning and manipulation for roentgenography	
Friday		Review	Cleaning and inspection of equipment	
Saturday		Weekly Examinations		No Classes

36th Week

Monday	Section 2. Walter Reed General Hospital. Section 3. Typing Section 1. Maintenance and Repair Shop	Medical Department Supply Catalog	Section 2. W. R. G. H. Sections 3. & 1. Positioning	
Tuesday		Non-expendable x-ray supplies	and manipulation for roentgenography	
Wednesday		Expendable x-ray supplies	No Classes	
Thursday		Credit and Exchange records	Section 2. W. R. G. H. Sections 3. & 1. Positioning and manipulation for roentgenography	
Friday		Review	Cleaning and inspection of equipment	
Saturday		Weekly Examinations		No Classes

WEEKLY SCHEDULE

37th Week

	8:30 A.M. to 10:30 A.M.	10:30 A.M. to 11:30 A.M. Lectures	1:00 P.M. to 3:00 P.M.	3:00 P.M. to 4:00 P.M.
Monday	Section 2. Walter Reed General Hospital Section 3. Typing Section 1. Maintenance and Repair Shop	Trouble testing; fuses	Section 2. W. R. G. H. Sections 3. & 1. Test	
Tuesday		Trouble testing; switches, circuit breakers	problems and Shop work	
Wednesday		Trouble testing; open circuits	No Classes	
Thursday		Trouble testing; filament defects	Section 2. W. R. G. H. Sections 3. & 1. Test problems and shop work	
Friday		Trouble testing; transformer defects	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

38th Week

Monday	Section 2. Walter Reed General Hospital Section 3. Typing Section 1. Maintenance and Repair Shop	Line focus tubes	Section 2. W. R. G. H. Section 3. & 1. Test	
Tuesday		Shockproof tubes	Problems and Shop work	
Wednesday		Ray proof tubes	No Classes	
Thursday		Tube capacities	Section 2. W. R. G. H. Sections 3. & 1. Test problems and shop work	
Friday		Focalographs	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

WEEKLY SCHEDULE

39th Week

	8:30 A.M. to 10:30 A.M.	10:30 A.M. to 11:30 A.M. Lectures	1:00 P.M. to 3:00 P.M.	3:00 P.M. to 4:00 P.M.
Monday	Section 2. Walter Reed General Hospital Section 3. Typing Section 1. Maintenance and Repair Shop	Dental x-ray tubes	Section 2. W. R. G. H.	Sections 3. & 1. Test problems and shop work
Tuesday		X-ray therapy tubes		
Wednesday		3 phase electrical currents	No Classes	
Thursday		3 phase rectification	Section 2. W. R. G. H. Sections 3. & 1. Test problems and shop work	
Friday		Stroboscope	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

40th Week

Monday	Section 2. Walter Reed General Hospital Section 3. Typing Section 1. Maintenance and Repair Shop	Hand timers	Section 2. W. R. G. H.	Sections 3. & 1. Test problems and shop work
Tuesday		Synchronous timers		
Wednesday		Impulse timers	No Classes	
Thursday		Modern Mobile Units	Section 2. W. R. G. H. Sections 3. & 1. Test problems and shop work	
Friday		Review	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

WEEKLY SCHEDULE

41st Week

	8:30 A.M. to 10:30 A.M.	10:30 A.M. to 11:30 A.M. Lectures	1:00 P.M. to 3:00 P.M.	3:00 P.M. to 4:00 P.M.
Monday	Section 2. Walter Reed General Hospital Section 3. Typing Section 1. Maintenance and Repair Shop	Condensers	Section 2. W. R. G. H. Sections 3. & 1. Test problems and shop work	
Tuesday		Half-wave rectification units	No Classes	
Wednesday		Full-wave rectification units		
Thursday		Constant potential rectification	Section 2. W. R. G. H. Sections 3. & 1. Test problems and shop work	
Friday		Review	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

42nd Week

Monday	Section 2. Walter Reed General Hospital Section 3. Typing Section 1. Maintenance and Repair Shop	Fixed Flat : grids	Section 2. W. R. G. H. Sections 3. & 1. Test problems and shop work	
Tuesday		Modern Moving grids	No Classes	
Wednesday		High Milliamperage Technique		
Thursday		Fast and Slow intensifying screens	Section 2. W. R. G. H. Sections 3. & 1. Test problems and shop work	
Friday		Patient fixation methods	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

WEEKLY SCHEDULE

43rd Week

	8:30 A.M. to 10:30 A.M.	10:30 A.M. to 11:30 A.M. Lectures	1:00 P.M. to 3:00 P.M. 3:00 P.M. to 4:00 P.M.
Monday	Section 1. Walter Reed General Hospital Section 2. Typing Section 3. Maintenance and Repair Shop	Modern Stationary Units	Section 1. W. R. G. H. Sections 2. & 3. Test problems and shop work
Tuesday		Ibid	
Wednesday		Ibid	No Classes
Thursday		Ibid	Section 1. W. R. G. H. Sections 2. & 3. Test problems and shop work
Friday		Ibid	Cleaning and inspection of equipment
Saturday	Weekly Examinations		No Classes

44th Week

Monday	Section 1. Walter Reed General Hospital Section 2. Typing Section 3. Maintenance and Repair Shop	Calibration of x-ray quantity output	Section 1. W. R. G. H. Sections 2. & 3. Test problems and shop work
Tuesday		Skin tolerance	
Wednesday		Factors responsible for variations in x-ray output	No Classes
Thursday		Calibration of x-ray quality- the half value layer	Section 1. W. R. G. H. Sections 2. & 3. Test problems and shop work
Friday		Review	Cleaning and inspection of equipment
Saturday	Weekly Examinations		No Classes

WEEKLY SCHEDULE

45th Week

	8:30 A.M. to 10:30 A.M.	10:30 A.M. to 11:30 A.M. Lectures	1:00 P.M. to 3:00 P.M.	3:00 P.M. to 4:00 P.M.
Monday	Section 1. Walter Reed General Hospital Section 2. Typing Section 3. Maintenance and Repair Shop	Kilovoltage and filtration effects	Section 1. W. R. G. H. Sections 2. & 3. Test problems and shop work	
Tuesday		Characteristic rays		
Wednesday		The effects of portal variations	No Classes	
Thursday		Lead coverage	Section 1. W. R. G. H. Sections 2. & 3. Test problems and shop work	
Friday		Biogenetic effects	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

46th Week

Monday	Section 1. Walter Reed General Hospital Section 2. Typing Section 3. Maintenance and Repair Shop	Variations in film quality	Section 1. W. R. G. H. Sections 2. & 3. Test problems and shop work	
Tuesday		Film Testing		
Wednesday		Duplicating films	No Classes	
Thursday		Conservation of films	Section 1. W. R. G. H. Sections 2. & 3. Test problems and shop work	
Friday		Review	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

WEEKLY SCHEDULE

47th Week

	8:30 A.M. to 10:30 A.M.	10:30 A.M. to 11:30 A.M. - Lectures	1:00 P.M. to 3:00 P.M. 3:00 P.M. to 4:00 P.M.
Monday	Section 1. Walter Reed General Hospital Section 2. Typing Section 3. Maintenance and Repair Shop	Pelvimetry	Section 1. W. R. G. H.
Tuesday		Distortion factors in pelvimetry	Sections 2. & 3. Test problems and shop work
Wednesday		Pelvimetry; the Johnson Method	No Classes
Thursday		Outline of note book requirements	Section 1. W. R. G. H. Sections 2. & 3. Test problems and shop work
Friday		Review	Cleaning and inspection of equipment
Saturday	Weekly Examinations		No Classes

48th Week

Monday	Section 1. Walter Reed General Hospital Section 2. Typing Section 3. Maintenance and Repair Shop	Report of Special problem	Section 1. W. R. G. H.
Tuesday		Ibid	Sections 2. & 3. Test problems and shop work
Wednesday		Ibid	No Classes
Thursday		Ibid	Section 1. W. R. G. H. Sections 2. & 3. Test problems and shop work
Friday		Ibid	Cleaning and inspection of equipment
Saturday	Weekly Examinations		No Classes

WEEKLY SCHEDULE

49th Week

	8:30 A.M. to 10:30 A.M.	10:30 A.M. to 11:30 A.M. Lectures	1:00 P.M. to 3:00 P.M.	3:00 P.M. to 4:00 P.M.
Monday	Section 1. Walter Reed General Hospital Section 2. Typing Section 3. Maintenance and Repair Shop	Report of Special problem	Section 1. W. R. G. H. Sections 2. & 3. Test problem and shop work	
Tuesday		Ibid		
Wednesday		Ibid	No Classes	
Thursday		Ibid	Section 1. W. R. G. H. Sections 2. & 3. Test problem and shop work	
Friday		Ibid	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

50th week

Monday	Section 1. Walter Reed General Hospital Section 2. Typing Section 3. Maintenance and Repair Shop	Report of Special problem.	Section 1. W. R. G. H. Sections 2. & 3. Test problem and shop work	
Tuesday		Ibid		
Wednesday		Ibid	No Classes	
Thursday		Ibid	Section 1. W. R. G. H. Sections 2. & 3. Test problem and shop work	
Friday		Ibid	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

WEEKLY SCHEDULE

51st week

	8:30 A.M. to 10:30 A.M.	10:30 A.M. to 11:30 A.M. Lectures	1:00 P.M. to 3:00 P.M.	3:00 P.M. to 4:00 P.M.
Monday	Section 1. Walter Reed General Hospital Section 2. Typing Section 3. Maintenance and Repair Shop	Report of Special Problem	Section 1. R. G. H. Sections 2. & 3. Test	
Tuesday		Ibid	problem and shop work	
Wednesday		Ibid	No Classes	
Thursday		Ibid	Section 1. R. G. H. Sections 2. & 3. Test problems and shop work	
Friday		Ibid	Cleaning and inspection of equipment	
Saturday	Weekly Examinations		No Classes	

52nd week

This week will be devoted to visiting x-ray clinics in and around Washington, D. C.; to final arrangements of note books and preparations for the return to the respective stations. Graduation ceremonies will take place at 11:00 A.M. on the last day.

